Recall the example from the course:

```
class World {
  boolean z;
  int u;
  int f(boolean y) {
    z = y;
    if (u > 0) {
      int z;
      z = f(u) + 3;
      return z+z;
    } else {
      return 0;
    }
  }
}
```

Let $Gamma_1$ be the environment obtained from the $Class$ declaration (with methods and global variables):
$\Gamma_0 = (z : Bool), (u : Int), (f : Bool \to Int)$
Let us type check the code inside the method f: we add a binding for f's parameter in the environment:
$\Gamma_1 = \Gamma_0 \oplus (y : Bool)$ **We obtain the tree $Tree_0$:**

$$\dfrac{\dfrac{(z, Bool) \in \Gamma_1}{\Gamma_1 \vdash z : Bool} \quad \dfrac{(y, Bool) \in \Gamma_1}{\Gamma_1 \vdash y : Boll}}{\Gamma_1 \vdash z = y : void} \quad \dfrac{\dfrac{\dfrac{(u, Int) \in \Gamma_1}{\Gamma_1 \vdash u : Int} \quad \dfrac{\vdash 0 : Int}{\Gamma_1 \vdash 0 : Int}}{\Gamma_1 \vdash u > 0 : Bool} \quad Tree_1}{\Gamma_1 \vdash \{int\, z;\ z = f(u) + 3;\ return\, z + z;\} : Int} \quad \dfrac{\dfrac{\vdash 0 : Int}{\Gamma_1 \vdash 0 : Int}}{\Gamma_1 \vdash \{return\, 0;\} : Int}}{\Gamma_1 \vdash if\, (u > 0)\, \{int\, z;\ z = f(u) + 3;\ return\, z + z;\}\, else\, \{return\, 0;\} : Int}$$

$$\dfrac{\Gamma_1 \vdash z = y : void \qquad \Gamma_1 \vdash if\, (u > 0)\, \{int\, z;\ z = f(u) + 3;\ return\, z + z;\}\, else\, \{return\, 0;\} : Int}{\Gamma_1 \vdash z = y;\ if\, (u > 0)\, \{int\, z;\ z = f(u) + 3;\ return\, z + z;\}\, else\, \{return\, 0;\} : Int}$$

Unfortunately, our program is not type correct. We can see it trying to complete the derivation ($Tree_1$):

$$\dfrac{\dfrac{(z, Int) \in \Gamma_1 \oplus (z, Int)}{\Gamma_1 \oplus (z, Int) \vdash z : Int} \quad \dfrac{\dfrac{\dfrac{(u, Int) \in \Gamma_1 \oplus (z, Int) \qquad !!!(f, Int \to Int) \notin \Gamma_1 \oplus (z, Int)!!!}{\Gamma_1 \oplus (z, Int) \vdash u : Int, f : Int \to Int}}{\Gamma_1 \oplus (z, Int) \vdash f(u) : Int} \quad \dfrac{\vdash 3 : Int}{\Gamma_1 \oplus (z, Int) \vdash 3 : Int}}{\Gamma_1 \oplus (z, Int) \vdash f(u) + 3 : Int} \quad \dfrac{\dfrac{(z, Int) \in \Gamma_1 \oplus (z, Int)}{\Gamma_1 \oplus (z, Int) \vdash z : Int} \quad \dfrac{(z, Int) \in \Gamma_1 \oplus (z, Int)}{\Gamma_1 \oplus (z, Int) \vdash z : Int}}{\Gamma_1 \oplus (z, Int) \vdash z + z : Int}}{\Gamma_1 \oplus (z, Int) \vdash z = f(u) + 3 : void} \quad \dfrac{\Gamma_1 \oplus (z, Int) \vdash z + z : Int}{\Gamma_1 \oplus (z, Int) \vdash return\, z + z : Int}}{\Gamma_1 \oplus (z, Int) \vdash \{z = f(u) + 3;\ return\, z + z;\} : Int}$$

If we change the call $f(u)$ in $f(u > 0)$, we can type our program:

$$
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\dfrac{\dfrac{(z, Int) \in \Gamma_1 \oplus (z, Int)}{\Gamma_1 \oplus (z, Int) \vdash z : Int}}{\Gamma_1 \oplus (z, Int) \vdash z : Int}
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\dfrac{\dfrac{(u, Int) \in \Gamma_1 \oplus (z, Int)}{\Gamma_1 \oplus (z, Int) \vdash u : Int}
\qquad
\dfrac{\vdash 0 : Int}{\Gamma_1 \oplus (z, Int) \vdash 0 : Int}
\qquad
(f, Bool \to Int) \in \Gamma_1 \oplus (z, Int)}{\Gamma_1 \oplus (z, Int) \vdash u > 0 : Bool, f : Bool \to Int}}{\Gamma_1 \oplus (z, Int) \vdash f(u > 0) : Int}
\qquad
\dfrac{\vdash 3 : Int}{\Gamma_1 \oplus (z, Int) \vdash 3 : Int}
}{\Gamma_1 \oplus (z, Int) \vdash f(u > 0) + 3 : Int}
\qquad
\dfrac{
\dfrac{(z, Int) \in \Gamma_1 \oplus (z, Int)}{\Gamma_1 \oplus (z, Int) \vdash z : Int}
\qquad
\dfrac{(z, Int) \in \Gamma_1 \oplus (z, Int)}{\Gamma_1 \oplus (z, Int) \vdash z : Int}
}{\Gamma_1 \oplus (z, Int) \vdash z + z : Int}
}{\Gamma_1 \oplus (z, Int) \vdash z = f(u > 0) + 3 : void}
\qquad
\dfrac{\Gamma_1 \oplus (z, Int) \vdash z + z : Int}{\Gamma_1 \oplus (z, Int) \vdash return\ z + z : Int}
}{\Gamma_1 \oplus (z, Int) \vdash \{z = f(u > 0) + 3;\ return\ z + z;\} : Int}
\qquad Tree_1 :
$$

Which rule did we add to the ones presented in the course in order to derive those trees?